REMARKS

Claims 1, 24, 25, 26, 50, 51, 52, 54, 55 and 62 have been amended. Claim 15 has been cancelled without prejudice or disclaimer. Claim 63 is newly added. After entry of this Amendment, claims 1-11, 13-14, 16-55, and 62-63 will be pending. Reconsideration and allowance based on the following remarks are respectfully requested.

REJECTIONS UNDER 35 U.S.C. §102

Claims 1-7, 9, 13-17, 20-22, 24, 25, 50, 51, and 62 were rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent Application Publication No. JP 11-354409 to Shiozawa (hereinafter "Shiozawa"). The rejection is respectfully traversed.

Applicant respectfully submits that the cited portions of Shiozawa fail to disclose a lithographic projection apparatus comprising, *inter alia*, a radiation absorber comprising a gas supply configured to supply an absorbent gas at a controlled concentration to at least one enclosure traversed by the beam of radiation, the absorbent gas serving to absorb radiation energy delivered by the beam of radiation to the substrate during exposure of the radiation-sensitive material to the patterned beam of radiation, wherein the radiation absorber is configured to have a gas concentration in a path of the beam of radiation that is controllably non-uniform in an unobstructed plane perpendicular to an optical axis of the radiation system, or the projection system, or both the radiation system and the projection system, as recited in claim 1.

The Office Action contends that Figures 3 and 5 and abstract of Shiozawa show a radiation absorber as claimed. *See Office Action* at pages 2-3. The cited portions of Shiozawa disclose an illuminator in which the oxygen concentration or wavelength of a source is changed to obtain a uniform illuminance distribution on a wafer in optical system 10. *See* Abstract of Shiozawa. For example, the nitrogen in a room 10b may be partially replaced with oxygen in order to change the illuminance distribution.

However, the cited portions of Shiozawa do not appear to disclose a radiation absorber as recited in claim 1. For example, it is recited in claim 1 that "the radiation absorber is configured to have a gas concentration in a path of the beam of radiation that is controllably non-uniform in an unobstructed plane perpendicular to an optical axis of the radiation system, or the projection system, or both the radiation system and the projection system" (emphasis added). Rather, the cited portions of Shiozawa disclose closed rooms 10a and 10b with a leaning light transmission member 10d to divide the spaces. *See* Shiozawa at paragraphs [0060] and [0066]. There is no indication in the cited portions of Shiozawa of a

gas concentration in a path of the beam of radiation that is controllably non-uniform, let alone in an unobstructed plane perpendicular to an optical axis. First, there is no indication that there is non-uniform gas concentration in the system 10 of Shiozawa. Further, even if there were, there is no indication that there is an unobstructed plane perpendicular to an optical in which the gas concentration would be controllably non-uniform. For example, referring to Figure 3 of Shiozawa, if a plane was taken directly across the middle of the system 10, the plane would be obstructed by the light transmission member 10d. Alternatively, if a plane was taken near the top or bottom of the system 10, the plane would have a uniform gas concentration. Therefore, any perpendicular plane in the system 10 of Shiozawa would be uniform or obstructed, not "non-uniform in an unobstructed plane" as claimed in claim 1. As such, for at least these reasons, the cited portions of Shiozawa fail to disclose or teach each and every feature recited in claim 1.

Therefore, Applicant respectfully submits that the cited portions of Shiozawa fail to disclose each and every element recited by claim 1. Claims 2-7, 9-11, 13-14, 16-17, and 20-22 depend from claim 1, and, therefore, are patentable over Shiozawa for at least the same reasons as provided above with respect to claim 1, and for the features recited therein.

Claim 24 recites a device manufacturing method comprising, *inter alia*, supplying an absorbent gas according to a concentration profile to an enclosure traversed by the beam of radiation to effect a desired attenuation of the patterned beam, the absorbent gas absorbing a wavelength of the radiation, the concentration varying across at least part of an unobstructed space traversed by the beam in a direction substantially perpendicular to a direction of the beam. Claim 25 recites a device manufacturing method comprising, *inter alia*, supplying an absorbent gas according to a concentration profile to an enclosure traversed by the beam of radiation to effect a desired non-uniform attenuation of the patterned beam, the absorbent gas absorbing a wavelength of the radiation, the concentration varying across at least part of an unobstructed space traversed by the beam in a direction substantially perpendicular to a direction of the beam.

Claims 24 and 25 are submitted as being patentable over the cited portions of Shiozawa for at least similar reasons as provided above for claim 1, and for the features recited therein. For example, the cited portions of Shiozawa fail to disclose or teach an absorbent gas in an enclosure wherein the concentration varies across at least part of an unobstructed space traversed by a beam in a direction substantially perpendicular to a direction of the beam as provided in claims 24 and 25. Thus, Applicant respectfully submits

that the cited portions of Shiozawa fail to disclose each and every feature as recited in claims 24 and 25.

Regarding claim 50, Applicant respectfully submits that the cited portions of Shiozawa fail to disclose a device manufacturing method comprising, *inter alia*, determining the energy of the radiation by supplying an interactive gas according to a concentration profile to an enclosure traversed by the radiation beam of radiation, and measuring particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the interactive gas to determine the amount of interaction of the beam of radiation with the interactive gas, wherein results of the measurement are used to control the energy and/or the duration.

The Office Action refers to elements 16 and 17 in Shiozawa, which appear to be sensors. However, as admitted at page 9 of the Office Action, Shiozawa does not disclose measuring the amount of interaction of the beam of radiation with the region of gas. Accordingly, the anticipation rejection must fail.

Further, sensor 16 measures the illuminance and illumination distribution on the front face of the wafer 13. Thus, the sensor 16 of Shiozawa is in the path of the beam of light, i.e., the sensor 16 measures particles in the path of the beam, for element 16 of Shiozawa to measure the light. Also, sensor 17 of Shiozawa, at most, is a light exposure monitor which measures indirect light reflected from mirror 6. Thus, part of the beam of light is reflected toward the sensor 17, i.e., the sensor 17 measures particles in the path of the beam.

However, none of the sensors 16 and 17 of Shiozawa provide a detector or sensor that, in operation, measures particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the interactive gas. Thus, Applicant submits that the cited portions of Shiozawa fail to disclose or teach, for example, measuring particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the gas to determine the amount of interaction of the beam of radiation with the gas, as recited in claim 50.

Claim 51 is patentable over the cited portions of Shiozawa for at least similar reasons as provided above for claim 50, and for the features recited therein.

Claim 62 recites a lithographic projection apparatus comprising, *inter alia*, a concentration controlled enclosure of radiation absorbent gas positioned to be traversed by the beam of radiation during exposure of the radiation-sensitive material; a plurality of gas supplies configured to supply a plurality of different absorbent gasses at controlled concentrations to the enclosure. Applicant respectfully submits that Shiozawa fails to disclose

or anticipate each and every feature of claim 62. There is no indication in the cited portions of Shiozawa of supply of a plurality of different absorbent gasses at controlled concentrations to an enclosure.

Thus, Applicant respectfully requests that the rejection of claims 1-7, 9-11, 13-14, 16-17, 20-22, 24, 25, 50, 51 and 62 under 35 U.S.C. §102(b) in view of Shiozawa be withdrawn and the claims be allowed.

REJECTIONS UNDER 35 U.S.C. §103

Claims 26-34, 36, 39, 41, 43, 44, 47, 48, and 52-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,545,746 to Nishi (hereinafter "Nishi"). Applicant respectfully traverses this rejection.

Applicant submits that the cited portions of Nishi fail to disclose or teach, for example, a lithographic projection apparatus comprising, *inter alia*, a sensor, in operation, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to interaction of the beam of radiation with the gas to determine the amount of the interaction of the beam of radiation with the gas, as recited in claim 26.

The Office Action refers to elements 9 and 30 of Nishi and refers to the disclosure in Nishi of an "exposure controller 1 [which] monitors the integral of the amount of exposure light applied to the surface of the wafer from the detection signal" and "monitoring the reflectivity of the wafer W based on the amount of light reflected by the fiducial mark member FM." *See* Office Action at pages 4-5 and Nishi at column 17, lines 32-42.

However, Applicant submits that the cited portions of Nishi make no mention or teaching of the sensor as recited in claim 26. Sensor 9 measures illuminating light reflected by beam splitter 8, i.e., the sensor 9 measures particles in the path of the beam. See, e.g., Nishi, col. 14, lines 52-60. Similarly, detecting system 30 detects light reflected from the wafer W through the projection optical system, i.e., the detecting system 30 measures particles in the path of the beam. See, e.g., Nishi, col. 17, lines 32-35.

Thus, none of sensor 9 and detecting system 30 of Nishi provide a sensor that, in operation, measures particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the interactive gas. Thus, Applicant submits that the cited portions of Nishi fail to disclose or teach, for example, measuring particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the gas to determine the amount of interaction of the beam of radiation with the gas, as recited in claim 26.

As acknowledged by the Office Action, Nishi does not explicitly disclose that sensor 9 or detecting system 30 measures the amount of interaction of the beam of radiation with the gas. *See* Office Action at page 6. The Office Action alleges that Nishi discloses controlling the radiation by controlling the gas which absorbs the radiation that it would be obvious to one of ordinary skill in the art that the radiation detected by sensor 9 or detecting system 30 of Nishi would provide an output that it proportional to an amount of interaction of a beam with a gas. Applicant respectfully disagrees. At most, the cited portions of Nishi would provide the ability to determine the amount of light applied to the wafer surface, reflectivity of the wafer surface, illuminance nonuniformity, and/or measurement of a spatial image. *See* Nishi, col. 14, lines 52-67 and col. 17, lines 32-42. Such a sensor or detecting system would not, however, disclose or teach a sensor, in operation, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that the cited portions of Nishi fail to disclose or teach each and every element recited by claim 26.

Claims 52, 54, and 55 are patentable over the cited portions of Nishi for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27-34, 36, 39, 41, 43, 44, 47, 48, and 53 respectfully depend from claims 26 and 52 and are, therefore, patentable for at least the same reasons provided above related to claims 26 and 52, and for the additional features recited therein.

Thus, Applicant respectfully submits that a *prima facie* case of obviousness has not be established, and requests that the rejection of claims 26-34, 36, 39, 41, 43, 44, 47, 48, and 52-55 under 35 U.S.C. §103(a) in view of Nishi be withdrawn and the claims be allowed.

Claims 26, 27, 30, 52, 54 and 55 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication 2001/0030740 A1 to Mori et al. (hereinafter "Mori"). The rejection is respectfully traversed.

Applicant submits that the cited portions of Mori fail to disclose a lithographic projection apparatus comprising, *inter alia*, a sensor, in operation, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to interaction of the beam of radiation with the gas to determine the amount of the interaction of the beam of radiation with the gas, as recited in claim 26.

For example, the cited light detector 24 of Mori measures the intensity of light, passing through the projection lens, in a path of the light beam. *See, e.g.,* Mori at FIG. 1 and paragraph [0058]. However, the cited portions of Mori do not disclose or teach that the detector 24 measures, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the gas.

As acknowledged by the Office Action, Mori does not explicitly disclose that sensor 44a determines the amount of interaction of the beam with the gas. *See* Office Action at page 7. The Office Action alleges that Mori discloses that there is inert gas inside the projection system, and, since there is some absorption of illumination light with inert gas, it would be obvious to one of ordinary skill in the art that the illumination detected by sensor 44a of Mori would measure the amount of interaction of a beam with gas. Applicant respectfully disagrees. At most, Mori provides a detector for detecting the intensity of light passing through the projection lens. Such a detector would not, however, disclose or teach a sensor, in operation, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that the cited portions of Mori fail to disclose or teach each and every element recited by claim 26.

Claims 52, 54, and 55 are patentable over the cited portions of Mori for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27 and 30 depend from claim 26 and are, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully submits that a *prima facie* case of obviousness has not be established, and requests that the rejection of claims 26, 27, 30, 52, 54 and 55 under 35 U.S.C. §103(a) over Mori be withdrawn and the claims be allowed.

Claims 26-34, 36-39, 41, 43, 44, 47, 48, and 52-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shiozawa. The rejection is respectfully traversed.

Applicant respectfully submits that the cited portions of Shiozawa fail to disclose or teach a lithographic projection apparatus comprising, *inter alia*, a sensor, in operation, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to interaction of the beam of radiation with the gas to determine the amount of the interaction of the beam of radiation with the gas, as recited in claim 26.

The Office Action refers to element 17 in Shiozawa, which appear to be a sensor. Sensor 17 of Shiozawa, at most, is a light exposure monitor which measures indirect light reflected from mirror 6. Thus, part of the beam of light is reflected toward the sensor 17, i.e., the sensor 17 measures particles in the path of the beam. Sensor 17 of Shiozawa does not provide or teach a detector or sensor that, in operation, measures particles scattered from a path of the beam of radiation due to the interaction of the beam of radiation with the interactive gas. Thus, Applicant submits that the cited portions of Shiozawa fail to disclose or teach, for example, measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the gas, as recited in claim 26.

Therefore, Applicant respectfully submits that the cited portions of Shiozawa fail to disclose or teach each and every element recited by claim 26.

Claims 52, 54, and 55 are patentable over the cited portions of Shiozawa for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27-34, 36-39, 41, 43, 44, 47, 48 and 53 depend from claims 26 and 52 respectively and are, therefore, patentable for at least the same reasons provided above related to claims 26 and 52 respectively, and for the additional features recited therein. Thus, Applicant respectfully submits that a *prima facie* case of obviousness has not be established, and requests that the rejection of claims 26-34, 36-39, 41, 43, 44, 47, 48, and 52-55 under 35 U.S.C. §103(a) over Shiozawa be withdrawn and the claims be allowed.

Claim 35 was rejected under 35 U.S.C. §103(a) as being unpatentable over Nishi as applied to claim 26 and further in view of U.S. Patent Application Publication No. 2003/0020888 to Tanaka et al. (hereinafter "Tanaka"). Applicant respectfully traverses this rejection.

Claim 35 depends from claim 26. As discussed above, the cited portions of Nishi fail to disclose or render obvious the features of claim 26.

Even assuming *arguendo* that the cited portions of Nishi and Tanaka are properly combinable (which Applicant does not concede), Applicant submits the cited portions of Tanaka fail to overcome the shortcomings of the cited portions of Nishi. For example, the cited portions of Tanaka merely disclose providing pressure sensors for sensing pressure within the spaces between the optical elements and adjusting the optical performance of the optical system based on the pressures detected by the pressure sensor. (*See, e.g.*, paragraph [0020] of Tanaka). The cited portions of Tanaka make no mention or suggestion of a sensor,

in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that a *prima facie* case of obviousness has not been established and that the cited portions of Nishi, Tanaka, or any proper combination thereof, fail to disclose or render obvious each and every element recited by claim 26. Claim 35 depends from claim 26 and is, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claim 35 under 35 U.S.C. §103(a) over Nishi in view of Tanaka be withdrawn and the claims be allowed.

Claims 45 and 46 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nishi as applied to claim 26, and further in view of U.S. Patent No. 6,353,219 to Kley (hereinafter "Kley"). The rejection is respectfully traversed.

Claims 45 and 46 depend from claim 26. As discussed above, the cited portions of Nishi fail to disclose or render obvious each and every claim element of claim 26.

Even assuming *arguendo* that the cited portions of Nishi and Kley are properly combinable (which Applicant does not concede), Applicant submits the cited portions of Kley fail to overcome the shortcomings of Nishi. The cited portions of Kley simply fail to disclose or render obvious a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, particles scattered from the path of the beam of radiation due to the interaction to determine the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that a *prima facie* case of obviousness has not been established and that the cited portions of Nishi, Kley, and any proper combination thereof fail to disclose or teach each and every element recited by claim 26. Claims 45 and 46 depend from claim 26 and are, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 45 and 46 under 35 U.S.C. §103(a) over Nishi in view of Kley be withdrawn and the claims be allowed.

Claims 10 and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shiozawa. The rejection is respectfully traversed.

Claims 10 and 11 depend from claim 1, and, therefore, are patentable over the cited portions of Shiozawa for at least the same reasons as provided above with respect to claim 1, and for the features recited therein.

Thus, Applicant respectfully requests that the rejection of claims 10 and 11 under 35 U.S.C. §103(a) in view of Shiozawa be withdrawn and the claims be allowed.

DOUBLE-PATENTING REJECTION

Claims 1-7, 9, 13, 15-19, 21-25, 50, 51, and 62 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2 and 5-23 of U.S. Patent No. 6,538,716. Claims 8, 14, 30 and 35 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 7, and 19 of U.S. Patent No. 6,538,716 in view of Tanaka. Claims 26, 29, 31-34, 36, 39-40, 43, 47-49, and 52-55 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2 and 5-23 of U.S. Patent No. 6,538,716 in view of Mori. Applicant traverses.

First, the present claims have been amended and so the Examiner may want to revisit these double-patenting rejections as they may no longer hold. Indeed, Applicant submits that the double-patenting rejections may not be proper with respect to the amended claims.

Further, MPEP §804(B)(1) requires that in order to establish a *prima face* case of obviousness-type double patenting, the examiner is required to perform the same analysis as required under 35 U.S.C. §103(a) for the determination of obviousness. In particular, the MPEP requires that the examiner particularly point out the differences between the pending claims and the claims of the patent at issue and explain the why the differences would have been obvious to one of ordinary skill in the art. As the Office Action does not point out any of the differences between claims 1, 2 and 5-23 of U.S. Patent 6,538,716 and the rejected claims, and also does not provide any analysis or explanation as to why these differences would be obvious, it is respectfully submitted that a *prima face* case of obviousness-type double patenting has not been presented. For example, the Office Action provides no explanation of how the claimed radiation-energy detector of claims 26 and 52 would be obvious from the gas composition sensor of claim 1 of U.S. Patent 6,538,716 or measuring a composition of gas of claim 19 of U.S. Patent 6,538,716, or any of their dependent claims.

It is respectfully submitted that the statement that "the current claims are broader and thus fully met by the prior patent" does not point out the differences between the about 40 claims of the present application and the 22 asserted claims of U.S. Patent 6,538,716, or explain why one of ordinary skill in the art would have determined the differences to be obvious. Moreover, Applicant has rebutted that the cited portions of Mori would make the present claims unpatentable and Applicant submits that the cited portions of Mori would not render obvious claims 26, 29, 31-34, 36, 39-40, 43, 47-49, and 52-55 if the 22 asserted claims of U.S. Patent 6,538,716 were proper prior art.

The instant application contains 54 claims, including 10 independent claims, of varying scope and coverage. U.S. Patent 6,538,716 contains 23 claims, including 2 independent claims. It is respectfully submitted that the Office Action has not set out a proper analysis for each of the rejected claims against the applicable claims of U.S. Patent 6,538,716 to satisfy the analysis required by the MPEP or to present a *prima facie* case. It is respectfully requested that the analysis be performed with respect to each of the rejected claims 1-9, 13-19, 21-25, 26, 29, 30-36, 39-40, 43, 47-49, 50-55, and 62, or withdraw the rejection.

However, Applicant would consider filing a terminal disclaimer when the obviousness-type double patenting rejections are the only rejections remaining in the application so Applicant can properly determine whether a terminal disclaimer is merited. Thus, if the present claims are otherwise allowable, but for the obviousness-type double patenting rejections, the Examiner is kindly requested to contact the undersigned regarding filing a terminal disclaimer at that time.

Accordingly, it is respectfully submitted that the rejection is improper and must be withdrawn.

All rejections have been addressed. It is respectfully submitted that the present application is in condition for allowance, and a notice to that effect is earnestly solicited. Should there be any questions or concerns regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,
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